

Log 1872 - 1926



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 20, 1987

In reply refer to: A-87-1 and -2

Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On March 22, 1985, a Swearingen SA 226TC airplane, operated as Sun Aire Flight 534, made an unintentional gear-up landing at Los Angeles International Airport, Los Angeles, California. Of the 14 occupants on board, only 1 person, a passenger who was seated in the plane of rotation of the right engine propeller, was seriously injured. The injury resulted when pieces of the engine propeller blades penetrated the side of the airplane cabin and struck the passenger. On January 9, 1983, Republic Airlines, Flight 927, a Convair 580, touched down on a snow-covered runway at Brainerd, Minnesota, and struck a 2- to 3-foot high snowbank near the right edge of the runway. Of the 33 occupants on board, 1 passenger was killed and 1 passenger was injured seriously when a broken propeller blade penetrated the cabin. Both of these passengers were seated in the plane of rotation of the engine propeller blades. More recently, on October 30, 1986, a passenger seated in the propeller plane of rotation aboard a Wings West, SA 226TC suffered injuries to the right leg when a piece of the right propeller blade went through the fuselage after the airplane made a gear up landing at Santa Barbara, California. This accident is still under investigation by the National Transportation Safety Board.

The Safety Board is aware of at least four other accidents and incidents since 1981 in which the airplane cabin interior adjacent to the engine propellers was damaged when pieces of propeller blades penetrated the cabin. Fortunately, the passenger seats adjacent to the propellers were unoccupied during each of these four occurrences, and, as a result, there were no associated injuries.

In the cases cited above, the majority of occurrences which precipitated the propeller blade penetrations were landing gear malfunctions which caused a spinning propeller blade to separate or fracture when it hit a solid object such as a runway surface. However, in one occurrence noted, a blade separation and penetration into the cabin occurred in-flight due to an engine failure.

Based on the foregoing, the Safety Board believes that attention is needed concerning the design of seating configurations or the incorporation of shielding to reduce the potential for injury to occupants seated in areas within the plane of rotation of engine propeller blades. The Board realizes that because of weight and cost penalties the amount of cabin shielding needed to prevent propeller blade penetration may be prohibitive with respect to retrofit of airplanes now in service. Further, the removal of

passenger seats adjacent to the plane of propeller rotation of airplanes currently in service may not be practical due to airplane operating limitations and associated operating cost penalties. However, if these features are considered during the initial design phases of propeller-powered airplanes, then a reduced potential for occupant injuries might be achieved without a major increase of cost or degradation of performance.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Initiate action to evaluate the feasibility of incorporating design features in new propeller-powered airplanes, which, in the event of a propeller blade separation or fracture, would reduce the potential for injury to persons seated in areas within the plane of rotation of the engine propellers or which would provide for passenger seating arrangements totally outside of the plane of propeller rotation. (Class III-Longer Term Action) (A-87-1)

If it is determined that design features can be incorporated in new propeller-powered airplanes that will reduce the potential of injury to persons seated in areas within the plane of rotation of engine propellers or that will provide for passenger seating arrangements totally outside the plane of propeller rotation, take the necessary action to include these features into 14 CFR 23 and 14 CFR 25 design requirements. (Class III-Longer Term Action) (A-87-2)

by: *Patricia A. Halam on*
Jim Burnett
Chairman *for*

National Transportation Safety Board
Washington, D.C. 20594

Brief of Accident/Incident

File No. - 6000 3/22/85 LOS ANGELES, CA A/C Reg. No. COYRD Time (Lcl) - 2026 PBT

-----Basic Information-----
 Type Operating Certificate--COMMUTER
 Name of Carrier -SUN AIRE
 Type of Operation -SCHEDULED, DOMESTIC, PASSENGER
 Flight Conducted Under -14 CFR 135
 Acc/Inc Occurred During -LANDING
 Aircraft Damage SUBSTANTIAL
 Fire ON GROUND
 Crew Pass
 Fatal 0
 Serious 0
 Minor 1
 Injuries None
 2
 10

-----Aircraft Information-----
 Make/Model - BHEARINGEN SA 226TC
 Landing Gear - TRICYCLE-RETRACTABLE
 Max Gross Wt - 12500
 No. of Seats - 20
 End Make/Model - AIRESEARCH TPE-331
 Number Engines - 2
 Engine Type - TURBOPROP
 Rated Power - 840 HP
 ELT Installed/Activated - YES/NO
 Stall Warning System - YES

-----Environment/Operations Information-----
 Weather Data
 Wx Briefing - COMPANY
 Method - IN PERSON
 Completeness - WEATHER NOT PERTINENT
 Basic Weather - VMC
 Wind Dir/Speed - 120/004 KTS
 Visibility - 15.0 SM
 Lowest Sky/Clouds - CLEAR
 Lowest Ceiling - NONE
 Obstructions to Vision - NONE
 Precipitation - NONE
 Condition of Light - NIGHT(DARK)
 Itinerary
 Last Departure Point IMPERIAL, CA
 Destination SAME AS ACC/INC
 ATC/Airspace
 Type of Flight Plan - COMPANY (VFR)
 Type of Clearance - VFR
 Type Arch/Lnds - STRAIGHT-IN
 FULL STOP
 Airport Proximity
 ON AIRPORT
 Airport Data
 LOS ANGELES INTL - 25R
 Runway Ident - 12091/ 150
 Runway Lth/Wid - CONCRETE
 Runway Surface - DRY
 Runway Status

-----Personnel Information-----
 Pilot-In-Command
 Certificate(s)/Rating(s)
 COMMERCIAL, ATP, CFI
 SE LAND, ME LAND, SE SEA
 Age - 40
 Biennial Flight Review
 Current - YES
 Months Since - 2
 Aircraft Type - SA277TC
 Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
 Flight Time (Hours)
 Total 9993
 Make/Model 1658
 Instrument UNK/NR
 Multi-End UNK/NR
 Last 24 Hrs 4
 Last 30 Days UNK/NR
 Last 90 Days UNK/NR
 Rotorcraft UNK/NR

-----Instrument Rating(s) - AIRPLANE-----
 Narrative
 ON THIS LEG OF THE FLT, THE 1ST OFFICER (FO) WAS FLYING THE ACFT WHILE THE CAPTAIN (CAPT) WAS MONITORING & CONDUCTING ATC COMMUNICATIONS. REPORTEDLY, THE AIRCREW HAD FOLLOWED THE CHECKLIST DURING ARRIVAL HOWEVER, THE ACFT WAS LANDED WITH THE GEAR RETRACTED, WHEN THE ACFT TOUCHED DOWN, PIECES OF THE R PROP BLADES BROKE OFF & ENTERED THE RIGHT SIDE OF THE FUSELAGE, BETWEEN & BELOW THE 1ST & 2ND WINDOWS. FIVE PIECES PENETRATED THE PASSENGER COMPARTMENT & SERIOUSLY INJURED A PASSENGER IN THE 1ST ROW. THE OTHER 1ST ROW PASSENGER RECEIVED MINOR INJURIES. THE CAPT STATED HE HAD PUT THE GEAR HANDLE IN THE DOWN POSITION, THE FO REMEMBERED CALLING FOR GEAR EXTENSION, BUT DID NOT RECALL ACTUALLY NOTICING THE GEAR BEING LOWERED. DAMAGES INDICATED THE GEAR DOORS WERE CLOSED DURING TOUCHDOWN, THE GEAR & WARNING SYSTEMS WERE CHECKED & THEY FUNCTIONED NORMALLY. THE FO HAD PULLED THE GEAR WARNING CIRCUIT BREAKER (CB) ON THE PREV FLT, BUT HAD RESET IT. HE SPECULATED THE CB MAY NOT HAVE BEEN ALL THE WAY IN (NOT FULLY RESET); THUS, DEACTIVATING THE GEAR WARNING SYSTEM.

Brief of Accident/Incident (Continued)

File No. - 6000 3/22/85 LOS ANGELES, CA A/C Reg. No. COYRD Time (Lcl) - 2026 P8T

Occurrence IN FLIGHT COLLISION WITH TERRAIN
Phase of Operation LANDING - FLARE/TOUCHDOWN

Findings(s)

1. ELECTRICAL SYSTEM, CIRCUIT BREAKER - NOT ENGAGED
2. LANDING GEAR, GEAR WARNING SYSTEM - INOPERATIVE
3. GEAR EXTENSION - NOT ATTAINED - PILOT IN COMMAND
4. GEAR EXTENSION - NOT IDENTIFIED - COPILOT
5. WHEELS UP LANDING - INADVERTENT -

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident/incident is/are findings(s) 3,4,5

Factor(s) relating to this incident is/are findings(s) 1

National Transport
Washington

ion Safety Board
D.C. 20594

Report of Accident

Time (Lcl) - 1940 CST

A/C Reg. No. N844H

1709/35 BRAINERD, MH

File No. - 351

Basic Information
Type Operating Certificate - AIR CARRIER - FLAG/DOMESTIC
Type of Carrier - REPUBLIC AIRLINES, INC.
Type of Operation - SCHEDULED/DOMESTIC/PASSENGER
Flight Conducted Under - 14 CFR 121
Accident Occurred During - LANDING
Aircraft Damage - SUBSTANTIAL
Aircraft Make/Model - ALLISON 501D-13
Number Engines - 2
Engine Type - RECIPROCATING-CARRURETOR
Rated Power - 3750 Hp

Personnel Information
Pilot in Command - BRAINERD, MH
Crew - 0
Pass - 1
Injuries - Fatal 0, Serious 0, Minor 0, None 23

Environmental/Operations Information
Weather Data - COMPANY
Pilot Briefing - IN PERSON
Method - FULL
Completeness - I-C
Basic Weather - CALM
Wind Dir/Speed - 1,000 SM
Visibility - 300 FT
Lowest Ceiling - 300 FT
Obstructions to Vision - FOG
Precipitation - SNOW SHOWER
Condition of Light - NIGHT(DARK)

Itinerary
Last Departure Point - MINNEAPOLIS, MN
Destination - BRAINERD, MN
ATC/Airspace - IFR
Type of Flight Plan - IFR
Type of Clearance - ILS-LOCALIZER
Type Appch/Lndg

Airport Data
BRAINERD CROW MING CO
Runway Ident - 23
Runway Lth/Wid - 6500/ 150
Runway Surface - ASPHALT
Runway Status - ICE COVERED
Runway Status - SNOW - COMPACTED

Medical Certificate - VALID MEDICAL - NO WAIVERS/LIMIT
Age - 32
Biennial Flight Review - YES
Current - YES
Months Since - 3
Aircraft Type - UNK/MR
Total Flight Time (Hours) - 12730
Make/Model - UNK/MR
Instrument - UNK/MR
Rotorcraft - UNK/MR
Multi-Eng - UNK/MR

Instrument Rating(s) - AIRPLANE

During Arrival - THE ACFT WAS LANDED ABOUT 1725 FT BEYOND THE RWY THRESHOLD. THE TOUCHDOWN WAS MADE WITH THE RIGHT WING DOWN. THE RIGHT MAIN GEAR ABOUT 37 FT FROM THE RIGHT EDGE OF THE RWY. AFTER TOUCHDOWN, THE ACFT CONTINUED TO THE RIGHT. THE RIGHT PROPELLER STRUCK A 2 TO 3 FT HIGH SNOWBANK WHICH WAS BETWEEN THE EDGE OF THE RWY & THE RWY EDGE LIGHTS. THE RIGHT PROPELLER SEPARATED FROM THE PROPELLER & ENTERED THE CABIN, FATALY INJURING 1 PASSENGER & SERIOUSLY INJURING ANOTHER. INVESTIGATION REVEALED THAT RWY PLUGHING ACTIVITIES, 2 DAYS BEFORE THE ACCIDENT, HAD LEFT SNOWBANKS AT THE EDGE OF THE RWY INSIDE THE RWY EDGE LIGHTS. THEY HAD NOT BEEN REMOVED PER 14 CFR 139.85 & ARPT OPNS MANUAL. THERE WAS NO NOTAM FOR SNOWBANKS & THE COMPANY STATION MANAGER DID NOT NOTIFY THE AIRCREW ABOUT THEIR LOCATION. THE FLIGHT CREW DID NOT AWARE THAT WHEN THE 1ST OFFICER DIMMED THE INTENSITY OF THE APCH LIGHTS (BY ACTIVATING THE MIC SWITCH) THAT THE RWY EDGE LIGHTS ALSO DIMMED. THE CATT BELIEVED HE LOST SOME PERIPHERAL CUES AFTER TOUCHDOWN.

SE LAND/MC LAND/SE SEA

ELT Installed/Activated - UNK/MR
Stall Warning System - YES

Airport Proximity
ON AIRPORT

Page 1

Brief of Accident (Continued)

File No. - 3351

1/09/83

BRAINERD,MN

A/C Res. No. N844H

Time (Lcl) - 1940 CST

Occurrence #1 ON GROUND COLLISION WITH TERRAIN
Phase of Operation TAKEOFF - INITIAL CLIMB

Findings(s)

1. AIRPORT SNOW REMOVAL - IMPROPER - AIRPORT PERSONNEL
2. NOTAMS - NOT ISSUED - AIRPORT PERSONNEL
3. UNSAFE/HAZARDOUS CONDITION - NOT IDENTIFIED - COMPANY/OPERATOR MGMT
4. LIGHT CONDITION - DARK NIGHT
5. WEATHER CONDITION - LOW CEILING
6. WEATHER CONDITION - FOG
7. WEATHER CONDITION - SNOW
8. WEATHER CONDITION - OBSCURATION
9. PROPER ALIGNMENT - NOT ATTAINED - PILOT IN COMMAND
10. IMPROPER USE OF EQUIPMENT/AIRCRAFT,VISUAL/AURAL PERCEPTION - PILOT IN COMMAND
11. AIRPORT FACILITIES,RUNWAY/LANDING AREA CONDITION - ICY
12. AIRPORT FACILITIES,RUNWAY/LANDING AREA CONDITION - SNOW COVERED
13. AIRPORT FACILITIES,RUNWAY/LANDING AREA CONDITION - SLUSH COVERED
14. DIRECTIONAL CONTROL - REDUCED -
15. TERRAIN CONDITION - SNOWBANK

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 9,15

Factor(s) relating to this accident is/are findings(s) 1,2,3,4,5,6,7,8,10,11,12,13